A compact band-pass filter for 144MHz

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IN this filter, the tuned circuits consist of a simple helix tuned by a small "top" capacitor. The two tuned circuits are arranged so that they are slightly over-coupled in order to provide an adequate bandwidth, which in this case is 4MHz wide with a maximum variation of 0·1dB and an insertion loss of 0·4dB. Coupling of the input and output connections is by tapping "low down" on each of the coils; the position of these taps is important for matching into the circuit because they particularly affect the insertion loss. There are no spurious responses below 600MHz, adjustment is quite simple and can be carried out on a received signal both for the tap positions and the tuning. The performance is shown in Fig 1.

Construction

The general arrangement is shown in Fig 2, and is based on the standard 4¾ by 3¾ by 2in die-cast box; the aluminium version of which is preferred. In the prototype, type N connections have been used, but any of the usual alternatives may be substituted.

The tuning capacitors used are not ideal, but it is doubtful if there is a readily available cheap alternative. With capacitors of lower minimum capacity it would be possible to increase the value of the inductor, but is not thought there would be any significant improvement in performance. If a different type of capacitor is used it should be remembered that the voltage across it will be relatively high.

The inductors are made from ⅛in diameter copper wound on a ⅜in mandrel; they consist of four full turns plus that required at the lower end to reach the central fixing. Care is needed to ensure that the coil spacing is correct; with the dimension given there is sufficient overcoupling to give a

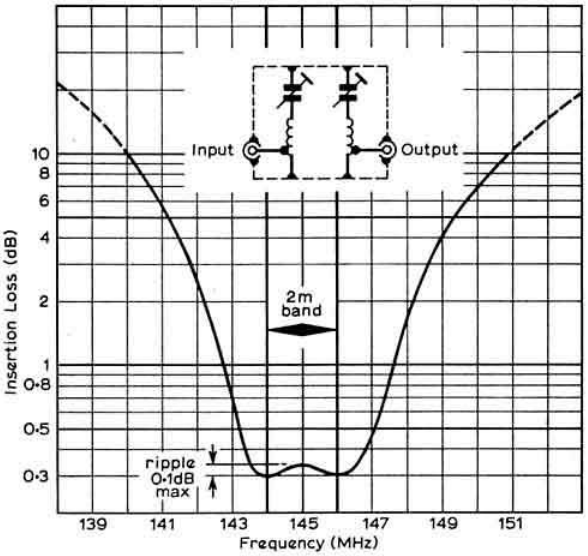
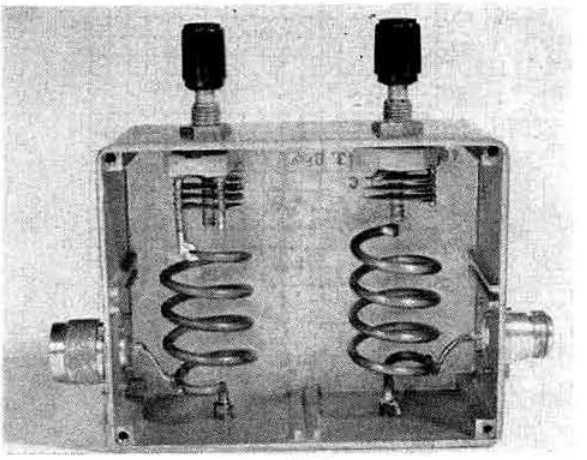


Fig 1. Performance



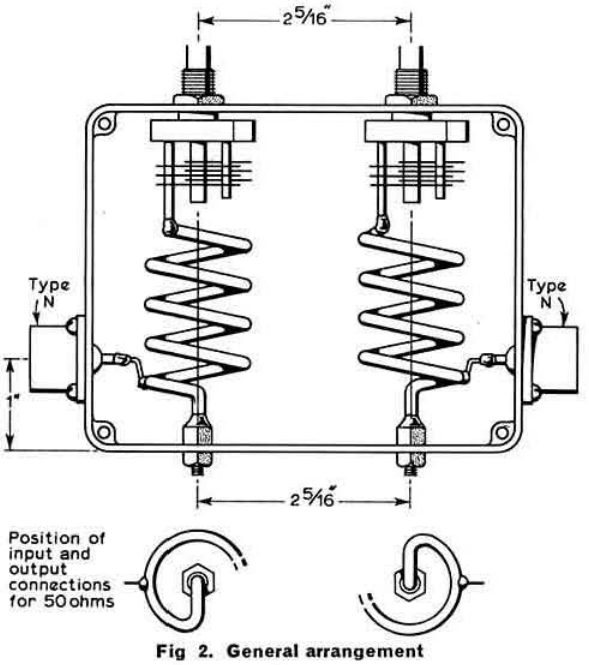


Fig 2. General arrangement

small ripple at the nose of the response curve. The method of fixing adopted was to solder the ⅛in diameter copper into a socket as used for the Erie type K1700 stand-off capacitor (see Fig 2), with the capacitor removed. Any alternative method of making a good electrical contact to the box would be suitable, bearing in mind the relatively high circulating current involved.

The tuning capacitors are Jackson type C804 trimmers 3·5 to 15pF with two plates removed from both the rotor and stator, leaving three fixed and three moving.

When the capacitor and coil are mounted and soldered together, the circuits should be rotated so that the tap point is opposite the input and output connectors; the connections being made of 16swg copper wire.

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